



**Rules and  
Regulations for  
the Classification of  
Special Service Craft,  
July 2008**

**Notice No. 2**

Effective Date of Latest  
Amendments:

See page 1

Issue date: November 2008

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**RULES AND REGULATIONS FOR THE  
CLASSIFICATION OF SPECIAL SERVICE CRAFT,  
*July 2008***

**Notice No. 2**

This Notice contains amendments within the following Sections of the *Rules and Regulations for the Classification of Special Service Craft, July 2008*. The amendments are effective on the dates shown:

<b><i>Part</i></b>	<b><i>Chapter</i></b>	<b><i>Section</i></b>	<b><i>Effective date</i></b>
1	1	2, 3, 4, 5	1 November 2008
3	1	8	1 August 2008
6	2	3, 4	1 August 2008
7	2	3, 4	1 August 2008

It will be noted that the amendments also include corrigenda, which are effective from the date of this Notice.

The *Rules and Regulations for the Classification of Special Service Craft, July 2008* are to be read in conjunction with this Notice No. 2. The status of the Rules is now:

Rules for Special Service Craft	Effective date:	July 2008
Notice No. 1	Effective dates:	1 August 2008 & Corrigenda
Notice No. 2	Effective dates:	1 August 2008 & 1 November 2008

## Part 1, Chapter 1

### General Regulations

Effective date 1 November 2008

#### Section 2

2.1 LR remains the sole classification society in the LR Group. LR is managed by a ~~corporate trustee Lloyd's Register Trustees Limited~~ Board of Trustees (hereinafter referred to as 'LR's trustee the Board').

LR's trustee The Board has:

Appointed a Classification Committee and determined its powers and functions;  
Appointed Technical Committees and determined their powers, functions and duties.

2.2 The LR Group has established National and Area Committees in the following:

Countries:	Areas:
Australia (via Lloyd's Register Asia)	Benelux (via Lloyd's Register EMEA)
Canada (via Lloyd's Register North America, Inc.)	Central America (via Lloyd's Register Central and South America Ltd)
China (via Lloyd's Register Asia)	Nordic Countries (via Lloyd's Register EMEA)
Egypt (via Lloyd's Register EMEA)	South Asia (via Lloyd's Register Asia)
Federal Republic of Germany (via Lloyd's Register EMEA)	Asian Shipowners (via Lloyd's Register Asia)
France (via Lloyd's Register EMEA)	Greece (via Lloyd's Register EMEA)
Italy (via Lloyd's Register EMEA)	
Japan (via Lloyd's Register Asia)	
New Zealand (via Lloyd's Register Asia)	
Poland (via Lloyd's Register (Polska) Sp zoo)	
Spain (via Lloyd's Register EMEA)	
United States of America (via Lloyd's Register North America, Inc.)	

#### Section 3

3.1 LR's Technical Committee is at present composed of:

Ex officio members:	TOTAL
• The Chairman of Lloyd's Register Holdings (LRH) LR	1
• The Chairman of the Classification Committee	1
<i>Members Nominated by:</i>	
• The General Committee of Trustees of LRH Board	18
• The Royal Institution of Naval Architects	2
• The Institution of Engineers and Shipbuilders in Scotland	2
• The Institute of Marine Engineers	2
• The Institution of Mechanical Engineers	2
• The Shipbuilders' and Shiprepairers' Association	2
• The Short Sea Group of the Chamber of Shipping	1
• The Society of Consulting Marine Engineers and Ship Surveyors	1
• The Institute of Materials	1
• The UK Steel Association	1
• The Honourable Company of Master Mariners	2
• The Institution of Electrical Engineers	1
• Federation of British Electrotechnical and Allied Manufacturers' Associations	1
• The Technical Committee	18
• The Technical Committee (from other countries)	18
• The Institute of Refrigeration	1
• International Oil Companies	2
• Association of European Shipbuilders and Shiprepairers	1
• Greek Shipping Co-operation Committee	1

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3.3 All elections are subject to confirmation by ~~LR's trustee~~ the Board.

3.5 The term of office of the Chairman and of all members of the Technical Committee is five years. Members may serve one additional term of office with the approval of ~~LR's trustee~~ the Board. The term of the Chairman may be extended with the approval of ~~LR's trustee~~ the Board.

3.8 Any proposal of the Technical Committee involving any alteration in, or addition to, ~~Part 1, Chapter 1 of Rules for Classification is referred to LR's Trustee which has agreed to seek the comments of the Lloyd's Register Holding's General Committee of Trustees before adopting the proposal~~ subject to approval of the Board. All other proposals for additions to or alterations to the Rules for Classification will, following approval by the Technical Committee, be submitted to the Board for adoption.

## ■ Section 4

4.1 LR's Naval Ship Technical Committee (hereinafter referred to as 'the NSTC') is at present composed of up to 50 members and includes nominees of:

- The Royal Navy and the UK Ministry of Defence;
- The Defence Evaluation and Research Agency;
- UK Shipbuilders, Ship Repairers and Defence Industry;
- Overseas Governments and Governmental Agencies;
- Overseas Shipbuilders, Ship Repairers and Defence Industries;
- Various maritime bodies and institutions, nominated by the NSTC;
- The Chairman of ~~LRI~~ LR and Chairman of the Classification Committee who are *ex officio* members.

4.2 All elections are subject to confirmation by ~~LR's trustee~~ the Board.

4.4 The term of office of the NSTC Chairman and of all members of the NSTC is five years. Members may serve one additional term of office with the approval of ~~LR's trustee~~ the Board. The term of the Chairman may be extended with the approval of ~~LR's trustee~~ the Board.

4.8 Following approval by the NSTC, details of new Rules (or amendments) will be submitted to ~~LR's trustee which will seek comments from LRI's General Committee of Trustees before adopting any changes~~ the Board for adoption.

## ■ Section 5

5.1 LR has the power to adopt, and publish as deemed necessary, Rules relating to Classification and has (in relation thereto) provided the following:

- (a) Except in the case of a special directive by ~~LR's trustee~~ the Board, no new Regulation or alteration to any existing Regulation relating to classification or to class notations is to be applied to existing ships.
- (b) Except in the case of a special directive by ~~LR's trustee~~ the Board, or where changes necessitated by mandatory implementation of International Conventions, Codes or Unified Requirements adopted by the International Association of Classification Societies are concerned, no new Rule or alteration in any existing Rule is to be applied compulsorily after the date on which the contract between the ship builder and shipowner for construction of the ship has been signed, nor within six months of its adoption. The date of 'contract for construction' of a ship is the date on which the contract to build the ship is signed between the prospective shipowner and the ship builder. This date and the construction number (i.e. hull numbers) of all the vessels included in the contract are to be declared by the party applying for the assignment of class to a newbuilding. The date of 'contract for construction' of a series of sister ships, including specified optional ships for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective shipowner and the ship builder. In this section a 'series of sister ships' is a series of ships built to the same approved plans for classification purposes, under a single contract for construction. The optional ships will be considered part of the same series of sister ships if the option is exercised not later than 1 year after the contract to build the series was signed. If a contract for construction is later amended to include additional ships or additional options, the date of 'contract for construction' for such ships is the date on which the amendment to the contract is signed between the prospective shipowner and the ship builder. The amendment to the contract is to be considered as a 'new contract'. If a contract for construction is amended to change the ship type, the date of 'contract for construction' of this modified vessel, or vessels, is the date on which the revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder. Where it is desired to use existing approved ship or machinery plans for a new contract, written application is to be made to LR. Sister ships may have minor design alterations provided that such alterations do not affect matters related to classification.
- ~~(e) That it will, in all cases, consult with LRI's General Committee of Trustees before passing any Rule amendment.~~
- (c) All reports of survey are to be made by Surveyors authorised by members of the LR Group to survey and report (hereinafter referred to as 'the Surveyors') according to the form prescribed, and submitted for the consideration of the Classification Committee.

## Part 1, Chapters 1

- ⇒ (d) Information contained in the reports of classification and statutory surveys will be made available to the relevant owner, National Administration, Port State Administration, P&I Club, hull underwriter and, if authorized in writing by that owner, to any other person or organization.
- (e) Notwithstanding the general duty of confidentiality owed by LR to its client in accordance with the LR Rules, LR clients hereby accept that, LR will participate in the IACS Early Warning System which requires each IACS member to provide its fellow IACS members and Associates with relevant technical information on serious hull structural and engineering systems failures, as defined in the IACS Early Warning System (but not including any drawings relating to the ship which may be the specific property of another party), to enable such useful information to be shared and utilised to facilitate the proper working of the IACS Early Warning System LR will provide its client with written details of such information upon sending the same to IACS Members and Associates.

## Part 3, Chapter 1

### General Regulations

Effective date 1 August 2008

#### Section 8

### Building tolerances and associated repairs

#### 8.3 Surface defects

8.3.3 When the limits in 8.3.1 are exceeded, plates ~~are to be made good by grinding or chipping followed by welding~~ may be made good by weld repair in accordance with the requirements specified in Chapter 13 of the Rules for Materials.

8.3.5 Complete removal of the defects is to be verified by suitable non-destructive examination techniques and after welding the repair is to be proved free from further defects. The complete removal of defects is to be verified by non-destructive examination in accordance with the requirements specified in Chapter 13 of the Rules for Materials.

#### 8.6 Structural misalignment and fit (steel and aluminium)

8.6.3 Welding defects are generally to be dealt with in accordance with ~~Chapter 2 of Parts 6 and 7 depending on materials used~~ Chapter 13 of the Rules for Materials. Limits for weld undercut and remedial action to be taken depends on plate thickness and are to be discussed and agreed by the Builder and the Surveyor prior to commencement of repairs.

## Part 6, Chapter 2

### Construction Procedures

Effective date 1 August 2008

#### Section 3

### Procedures for welded construction

#### 3.1 General

3.1.1 ~~The requirements of this Section are applicable to grades of steel welded using electric arc welding processes. Where it is proposed to use alternative welding processes, details are to be submitted for approval, prior to the start of fabrication.~~ All welded construction is to be conducted in accordance with the requirements specified in Chapter 13 of the Rules for Materials.

#### 3.3 Welding equipment

3.3.1 ~~Welding plant and appliances are to be suitable for the purpose intended and are to be maintained in an efficient condition. Suitable earthing arrangements are to be provided when welding is being carried out. Satisfactory storage facilities for consumables are to be provided close to working areas.~~

#### ~~3.4 Welding consumables~~

3.4.1 All welding consumables are to be approved by LR and are to be suitable for the type of joint and grade of material, see Chapter 11 of the Rules for Materials.

3.4.2 The following grades of consumable are to be used:

For normal strength steels:

- |         |  |
|---------|--|
| Grade 1 | For welding Grade A.   |
| Grade 2 | For welding any combination of grades other than Grade E to Grade E. |
| Grade 3 | For welding any combination of grades.                               |

For higher tensile steels:

- |          |  |
|----------|--|
| Grade 1Y | For welding Grade AH.  |
| Grade 2Y | For welding any combination of grades other than Grade EH to Grade EH. |
| Grade 3Y | For welding any combination of grades.                                 |

For joints between steels of different grades or different strength levels the welding consumable may be of a type suitable for the lesser grade or strength being connected. The use of a higher grade of welding consumable may be required ~~at discontinuities or other points of stress concentration.~~

## Part 6, Chapter 2

~~3.4.3~~ Where the carbon equivalent, calculated from the ladle analysis and using the formula given below, is in excess of 0,45 per cent, approved low hydrogen higher tensile welding consumable and preheating are to be used. Where the carbon equivalent is above 0,41 per cent but is not more than 0,45 per cent approved low hydrogen higher tensile welding consumable are to be used, but preheating will not generally be required except under conditions of high restraint or low ambient temperature. Where the carbon equivalent is not more than 0,41 per cent, any type of approved higher tensile welding consumable may be used and preheating will not generally be required except as above.

$$\text{Carbon equivalent} = C + \frac{\text{Mn}}{6} + \frac{\text{Cr} + \text{Mo} + \text{V}}{5} + \frac{\text{Ni} + \text{Cu}}{15}$$

This formula is applicable only to steels which are basically of the carbon-manganese type containing minor quantities of grain refining elements, for example, niobium, vanadium or aluminium. The proposed use of low alloy steels will be subject to special consideration.

3.4.4 Where the structure incorporates mild steel and higher tensile steel, details of the welding arrangements and procedures at the interchange joints are to be submitted for approval in all cases where the chemical analysis of the higher tensile steel requires that it be preheated.

3.4.5 Special care is to be taken in the distribution, storage and handling of all welding consumable. Effective facilities for protecting consumable are to be provided close to working areas.

### 3.5 Welder qualifications

3.5.1 Welding operators are to be proficient in the type of work on which they are engaged.

3.5.2 The responsibility for selection, training and testing of welding operators rests with the Builders. The Builders are to test welding operators to a suitable National Standard. Records of tests and qualifications are to be kept by the Builders and made available to the Surveyor so that he can be satisfied that the personnel employed during the construction of the craft can achieve the required standard of workmanship.

### 3.6 Welding procedures

3.6.1 Procedures are to be established for the welding of all joints including the type of consumables, joint preparation and welding position. New procedures will be approved on the basis of a detailed statement of the procedure and process parameters together with the results of examination and testing carried out on sample joints in the presence of the Surveyor. For this purpose, the sample joints are to be prepared under conditions similar to those which will occur during construction of the craft.

3.6.2 The approved arrangements, sequence and procedures are not to be departed from without the prior approval of the Surveyor.

~~3.6.3~~ The type and diameter of filler wire, the current, voltage, rate of deposit and number of runs, etc., are to conform to those established in accordance with 3.18. Provision is to be made for checking the above parameters at the welding area.

~~3.6.4~~ When required, weld repairs are to be carried out in accordance with the procedures laid down in 3.19.

### 3.7 3.3 Defined practices and welding sequence

~~3.7.1~~ Details of the welding procedures, see 3.6, and the sequence of welding assemblies and joining up of assemblies are to be submitted.

3.7.2 The proposed sequence of welding is to be agreed with the Surveyor prior to construction.

3.7.3 The type and disposition of connections and sequences of welding are to be so planned that any restraint during welding operations is reduced to a minimum.

3.7.4 Special attention is to be given to the examination of plating in way of all lifting eye plate positions to ensure freedom from cracks. This examination is not restricted to the positions where eye plates have been removed but includes the positions where lifting eye plates are permanent fixtures.

3.7.5 Careful consideration is to be given to assembly sequence and overall shrinkage of plate panels, assemblies, etc., resulting from welding processes employed. Welding is to proceed systematically with each welded joint being completed in correct sequence without undue interruption. Where practicable, welding is to commence at the centre of a joint and proceed outwards or at the centre of an assembly and progress outwards towards the perimeter so that each part has freedom to move in one or more directions. Generally, the welding of stiffener members including transverses, frames, girders, etc., to welded plate panels by automatic processes should be carried out in such a way as to minimise angular distortion of the stiffener.

3.7.6 Butt welds are to be finished full at the ends and cut back before welding the seams. Seams are generally not to be welded within 300 mm of an unwelded butt weld or welded across an unwelded butt joint.

~~3.7.7~~ 3.3.1 Rudder, sterntubes, propeller brackets and jet units. The final boring out of propeller brackets and sterntubes and the fit-up and alignment of rudder bearings and jet units are to be carried out after the major part of the welding of the aft end of the craft is complete. The contacts between rudder stocks and propeller shafts with bearings are to be checked before the final mounting.

~~3.7.8~~ Precautions are to be taken to screen and pre-warm as necessary the general and local weld areas. Surfaces are to be dry.

### 3.8 Shipyard practices

3.8.1 A sufficient number of skilled supervisors is to be provided to ensure an effective and systematic control at all stages of welding operations.



### 3.9 Welding environment

~~3.9.1 Adequate protection is to be provided where welding is required to be carried out in exposed positions in wet, windy or cold weather. In cold weather, precautions should be taken to pre-warm the work and screen where necessary to prevent too rapid cooling of the weld.~~

### 3.10 3.4 Structural arrangements and access

~~3.10.1 3.4.1 Ceilings, cabin sole, side and overhead linings are to be secured in such a manner as to be easily removed for the maintenance and inspection of the structure below.~~

~~3.10.2 Structural arrangements are to be such as will allow adequate ventilation and access for preheating, where required, and for the satisfactory completion of all welding operations. Welded joints are to be so arranged as to facilitate the use of downhand welding wherever possible.~~

### 3.11 Preparation

3.11.1 The preparation of plate edges is to be accurate and essentially free from blemishes. All joints are to be properly aligned and closed or adjusted before welding. Excessive force is not to be used in fairing and closing the work. Means are to be provided for holding the work in proper alignment without rigid restraint during welding operations. Where excessive gaps exist between surfaces or edges to be joined, the corrective measures adopted are to be to the satisfaction of the Surveyor, see Pt 3, Ch 1, 8.6.

3.11.2 Parts are to be set up and welded in such a way that contraction stresses are kept to a minimum.

3.11.3 Before a manual sealing run is applied to the back of a weld the original root run is to be cut back to sound metal.

3.11.4 Welding is to proceed systematically, each welded joint being completed in proper sequence without undue interruption.

3.11.5 Joint edges are to be scratch brushed (or other acceptable method) immediately before welding in order to remove oxide or adhering films of dirt and filings.

### 3.12 Cleanliness

3.12.1 The surfaces in way of all parts to be welded are to be clean, dry and free from grease and other contaminants which might adversely affect weld quality. The surfaces and boundaries of each run of deposit are to be thoroughly cleaned and free from slag before the next run is applied.

### 3.13 Heat treatment

~~3.13.1 Under conditions of high humidity, the parts to be welded are to be preheated.~~

~~3.13.2 Where the parts to be welded are large such that heat conduction prevents the joint from reaching the required temperature, or where the parts to be welded are below 5°C, preheating is to be used.~~

### 3.14 Tack welding

3.14.1 Tack welds are to be kept to the minimum and are to be of equal quality to the finished weld. Tack welds which are to be retained as part of the finished weld are to be clean and free from defects before being incorporated into the weld. Care is to be taken when removing tack welds and temporary attachments used for assembly to ensure that the material of the structure is not damaged.

3.14.2 Consumables for tack welding are to be of the same grade as those used for the main weld. Generally, tack welds are not to be applied in lengths of less than 30 mm for mild steel grades and 50 mm for higher tensile steel grades. Care is to be taken to ensure that tack welds, which are to be retained as part of the finished weld, are clean and free from defects before being incorporated. Where tack welds are to be removed, the Surveyors are to ensure that the methods adopted to remove them will not damage the material of the structure.

### 3.15 Alignment and fit

3.15.1 All joints are to be prepared, aligned and adjusted in accordance with the established joint design. Clamps with wedges or strong-backs used for this purpose are to be suitably arranged to allow freedom of lateral movement between adjacent elements.

3.15.2 Welded temporary attachments used to aid construction are to be removed carefully by grinding, cutting or chipping. The surface of the material is to be finished smooth by grinding followed by crack detection.

3.15.3 Any defects in the structure resulting from the removal of temporary attachments are to be prepared, efficiently welded and ground smooth so as to achieve a defect free repair.

### 3.16 Inspection

~~3.16.1 Effective arrangements are to be provided by the Builder for the visual inspection of finished welds in order to ensure that all welding has been satisfactorily completed.~~

### 3.17 3.5 Testing Inspection

~~3.17.1 3.5.1 Welds are to be clean and free from paint at the time of inspection.~~ Inspection of welded construction is to be conducted in accordance with the requirements specified in Chapter 13 of the Rules for Materials.

~~3.17.2 In addition to visual inspection, welded joints are to be examined using any one or a combination of ultrasonic, radiographic, magnetic particle, eddy current, dye penetrant or other acceptable methods appropriate to the configuration of the weld.~~

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~~3.17.3 The method to be used for the volumetric examinations of welds is the responsibility of the Builder. Radiography is generally to be used on butt welds of 15 mm thickness or less. Ultrasonic testing is acceptable for welds of 15 mm thickness or greater and is to be used for the examination of full penetration tee butt or cruciform welds or joints of similar configuration.~~

3.17.4 Non-destructive examinations are to be made in accordance with approved written procedures prepared by the Builder, which identify the method and technique to be used, the extent of the examination and the acceptance criteria to be applied.

3.17.5 Non-destructive examinations are to be undertaken by personnel qualified to the appropriate level of a certification scheme recognized by LR.

~~3.17.6~~ 3.5.2 Checkpoints examined at the pre-fabrication stage are to include ultrasonic testing on examples of the stop/start points of automatic welding and magnetic particle inspections of weld ends.

~~3.17.7 Checkpoints examined at the construction stage are generally to be selected from those welds intended to be examined as part of the agreed quality control programme to be applied by the Builder. The locations and numbers of checkpoints are to be agreed between the Builder and the Surveyor.~~

3.17.8 Particular attention is to be paid to highly stressed items. Magnetic particle inspection is to be used at ends of fillet welds, T-joints, joints or crossings in main structural members and at sternframe connections.

3.17.9 Checkpoints for volumetric examination are to be selected so that a representative sample of welding is examined.

~~3.17.10~~ 3.5.3 Typical locations for volumetric examination and number of checkpoints to be taken are shown in Table 2.3.1. A list of the proposed items to be examined is to be submitted for approval.

~~3.17.11 For the hull structure of refrigerated spaces and of craft designed to operate in low air temperatures, the extent of non-destructive examination will be specially considered.~~

3.17.12 For all craft types, the Builder is to carry out random non-destructive examination at the request of the Surveyor.

3.17.13 The full extent of any weld defect is to be ascertained by applying additional non-destructive examinations where required. Unacceptable defects are to be completely removed and where necessary, re-welded. The repair is to be examined after re-welding, see 3.19.

3.17.14 Results of non-destructive examinations made during construction are to be recorded and evaluated by the Builder on a continual basis in order that the quality of welding can be monitored. These records are to be made available to the Surveyors.

3.17.15 The extent of applied non-destructive examinations is to be increased when warranted by the analysis of previous results.

### ~~3.18~~ 3.6 Acceptance criteria

~~3.18.1~~ 3.6.1 All finished welds are to be sound and free from cracks and substantially free from lack of fusion, incomplete penetration, porosity and tungsten inclusions. The surfaces of welds are to be reasonably smooth and substantially free from undercut and overlap. Care is to be taken to ensure that the specified dimensions of welds have been achieved and that both excessive reinforcement and underfill of welds are avoided.

~~3.18.2 The quality and workmanship of welding of all fittings and attachments to main structure, both permanent and temporary, are to be equivalent to those of the main hull structure.~~

3.18.3 Visual examination of all welds is to be supplemented by non-destructive examination as considered necessary by the Surveyor.

3.18.4 Fairing, by linear or spot heating, to correct distortions due to welding is, in general, not to be carried out unless procedures have been approved to ensure that the properties of the material are not adversely affected. Visual examination of all heat affected areas and welds in the vicinity is to be carried out to ensure freedom from defects.

### 3.19 Weld repair

3.19.1 Repairs to defective welding are to be carried out using approved welding consumables and procedures. The repair is to be re-examined for further defects.

3.19.2 Tears and scars left on plating after the removal of temporary lifting lugs, cleats and other temporary fittings or attachments are to be built up by welding if necessary and dressed smooth.

3.19.3 When modifications or repairs have been made which result in openings having to be closed by welded inserts, particular care is to be given to the fit of the insert and the welding sequence. The welding should also be subject to non-destructive testing.

3.19.4 When misalignment of structural members either side of bulkheads, decks, etc., exceeds the agreed tolerance, the misaligned item is to be released, realigned and rewelded in accordance with an approved weld repair procedure, see *also* Pt 3, Ch 1,8.

### 3.20 Structural detail

3.20.1 Alignment of structure is to be in accordance with 3.15. Triaxial stresses are to be avoided, see *also* LR's *Guidance Notes for Structural Details*.

## Section 4

## Joints and connections

## 4.4 Butt welds

~~4.4.2~~ Abrupt change of section is to be avoided where plates of different thicknesses are to be butt welded. Where the difference in thickness exceeds 3 mm, the thicker plate to be welded is to be prepared with a taper not exceeding one in three or with a bevelled edge to form a welded joint proportioned correspondingly. Where the difference in thickness is less than 3 mm the transition may be achieved within the width of the weld. Difference in thickness greater than 3 mm may be accepted provided it can be proven by the Builder, through procedure tests, that the Rule transition shape can be achieved and that the weld profile is such that structural continuity is maintained to the Surveyor's satisfaction.

4.4.3 Where stiffening members are attached by continuous fillet welds and cross completely finished butt or seam welds, these welds are to be made flush in way of the faying surface. Similarly, for butt welds in webs of stiffening members, the butt weld is to be completed and generally made flush with the stiffening member before the fillet weld is made. The ends of the flush portion are to run out smoothly without notches or sudden change of section. Where these conditions cannot be complied with, a scallop is to be arranged in the web of the stiffening member. Scallops are to be of such size, and in such a position, that a satisfactory weld can be made.

~~4.4.4~~ 4.4.2 Where butt welds form a T-junction, the leg of the T is, where practicable, to be completed first including any back run. During the welding operation special attention is to be given to the completion of the weld at the junction, which is to be chipped back to remove crater cracks, etc., before the table is welded.

## 4.5 Fillet welds

~~4.5.1~~ T connections are generally to be made by fillet welds on both sides of the abutting plate, the dimensions and spacing of which are shown in Fig. 2.4.1. Where the connection is highly stressed, full penetration welding may be required. Where full penetration welding is required, the abutting plate may need to be bevelled.

~~4.5.2~~ 4.5.1 The throat thickness of fillet welds is to be determined from:

$$\text{Throat thickness} = t_p \times \text{weld factor} \times \left( \frac{d}{s} \right) \text{ mm}$$

where

$s$  = the length of correctly proportioned weld fillet, clear of end craters, in mm, and is to be 10 x plate thickness,  $t_p$ , or 75 mm, whichever is the lesser, but in no case to be taken less than 40 mm

$d$  = the distance between successive weld fillet, in mm

$t_p$  = plate thickness, in mm, on which weld fillet size is based, see 4.5.6

Weld factors are contained in Table 2.4.1.

NOTE

For double continuous fillet welding  $\left( \frac{d}{s} \right)$  is to be taken as 1 (see 4.8.1).

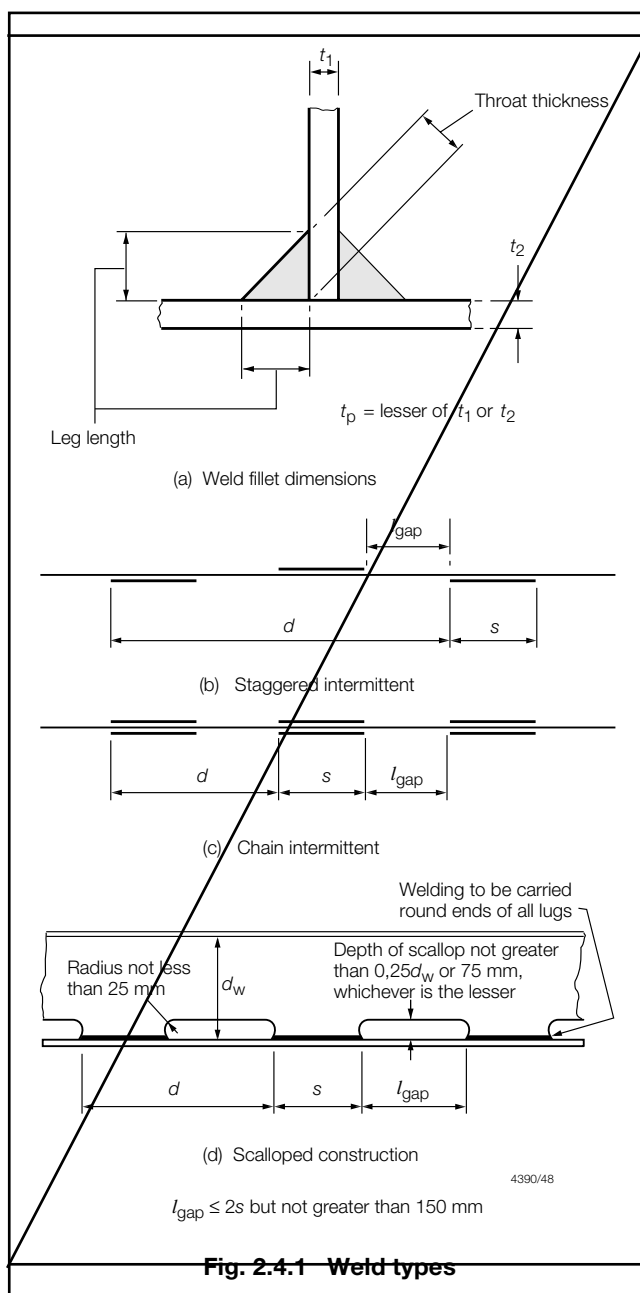


Fig. 2.4.1 Weld types

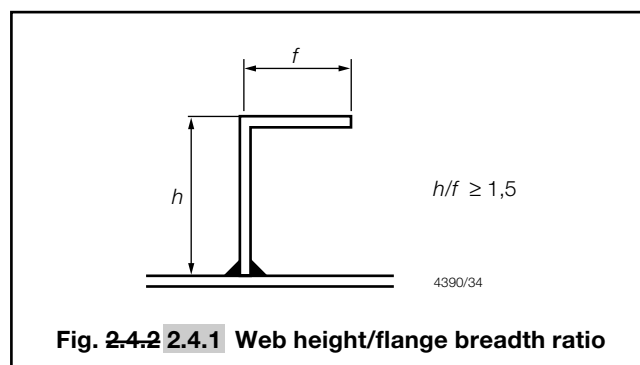


Fig. 2.4.2 Web height/flare breadth ratio

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~~4.5.3~~ **4.5.2** For ease of welding, it is recommended that the ratio of the web height to the flange breadth is greater than or equal to 1,5 (see Fig. ~~2.4.2~~ **2.4.1**).

~~4.5.4~~ Where an approved automatic deep penetration procedure is used, the weld factors given in Table 2.4.1 may generally be reduced by 15 per cent. Consideration may be given to reductions of up to 20 per cent provided that the Shipyard is able to consistently meet the following requirements:

- ~~(a) Suitable process selection confirmed by welding procedure tests covering both minimum and maximum root gaps.~~
- ~~(b) Demonstrate to the satisfaction of the Surveyor, that an established quality control system is in place.~~

Existing paragraphs 4.5.5 and 4.5.6 are to be renumbered 4.5.3 and 4.5.4.

### ~~4.6~~ **Throat thickness limits**

~~4.6.1~~ The throat thickness limits given in Table 2.4.2 are to be complied with.

### ~~4.7~~ **Single sided welding**

~~4.7.1~~ Where the main welding is carried out from one side only, a back sealing run is to be applied to all butt welds, after suitable back gouging, unless the welding process and consumables have been specially approved for one-side welding.

~~4.7.2~~ Where internal access for welding is impracticable, backing bars are to be fitted in way of butt and fillet welds, or alternative means of obtaining full penetration welds are to be agreed. Backing bars may be permanent or temporary.

~~4.7.3~~ Permanent backing bars are to be of the same material as the base metal and of thickness not less than the thickness of the plating being joined or 4 mm, whichever is the lesser. The weld is to be thoroughly fused to the backing bar.

~~4.7.4~~ Backing bars are to be continuous for the full length of the weld and joints in the backing bar are to be by full penetration welds, ground smooth.

~~4.7.5~~ Temporary backing bars for single sided welding may be austenitic stainless steel, glass tape, ceramic, or steel of the same grade as the base metal.

~~4.7.6~~ Temporary backing bars are to be suitably grooved in way of the weld to ensure full penetration.

Existing sub-Section 4.8 is to be renumbered 4.6.

### ~~4.9~~ **Full penetration welding**

~~4.9.1~~ Where full penetration welds are required in accordance with 4.4 and 4.5, these are to be made by welding from both sides with the root of the first weld back gouged to sound metal before welding the second side. The weld on the second side may be a sealing run.

~~4.9.2~~ Where access to the second side for welding is impracticable, backing bars are to be used in accordance with 4.7.

### ~~4.10~~ **4.7 Intermittent welding (staggered)**

~~4.10.1~~ Where intermittent welding is used, the welding is to be made continuous round the ends of brackets, lugs, scallops, etc.

~~4.10.2~~ **4.7.1** Staggered intermittent welding may be used, outside of the impact area in the bottom shell or cross-deck structure of high speed craft.

### ~~4.11~~ **4.8 Intermittent welding (chain)**

~~4.11.1~~ **4.8.1** Chain intermittent welding may be used, outside of the impact area in the bottom shell or crossdeck structure of high speed craft.

### ~~4.12~~ **Slot welding**

~~4.12.1~~ For the connection of plating to internal webs where access for welding is not practicable, the closing plating is to be attached by continuous full penetration welds, or by slot fillet welds to face plates fitted to the webs. Slots are, in general, to have a minimum length of ten times the plating thickness or 75 mm, whichever is the lesser, but in no case to be taken as less than 40 mm, and a minimum width of twice the plating thickness or 15 mm whichever is the greater, with well rounded ends. Slots cut in plating are to have smooth, clean and square edges and the distance between the slots is, in general, not to exceed 150 mm. Slots are not to be filled with welding. Alternative proposals for length, width and spacing of slot welds will be specially considered.

### ~~4.13~~ **Stud welding**

~~4.13.1~~ Where permanent or temporary studs are to be attached by welding to main structural parts in areas subject to high stress, the proposed location of the studs and the welding procedures adopted are to be to the satisfaction of the Surveyors.

### ~~4.14~~ **Lap connections**

~~4.14.1~~ Overlaps are generally not to be used to connect plates which may be subjected to high tensile or compressive loading and alternative arrangements are to be considered. Where, however, plate overlaps are adopted, the width of the overlap is not, in general to exceed four times nor be less than three times the thickness of the thinner plate and the joints are to be positioned so as to allow adequate access for completion of sound welds. The faying surfaces of lap joints are to be in close contact and both edges of the overlap are to have continuous fillet welds.

*Existing sub-Sections 4.15 to 4.23 are to be renumbered 4.9 to 4.17.*

#### **4.19 4.13 Notches and scallops**

~~4.19.1~~ **4.13.1** Notches and scallops are to be kept clear of the toes of brackets, etc. Openings are to be well rounded with smooth edges. ~~Details of scallops are shown in Fig. 2.4.1.~~

*Existing Fig. 2.4.3 is to be renumbered Fig. 2.4.2.*

#### **4.24 4.18 Joint preparation**

~~4.24.1~~ **4.18.1** ~~Welded joints are to be prepared in accordance with 3.11.~~ Typical butt joints are shown in LR's *Guidance Notes for Structural Details*.

~~4.24.2~~ All other types of joint are to be prepared, aligned and adjusted in accordance with the established joint design. ~~Excessive force is not to be used in fairing and closing the work. The surfaces of parts to be joined are to be accurate, clean, dry and free from blemishes, grease and other contaminants which might adversely affect the joint quality.~~

*Existing sub-Sections 4.25 to 4.30 are to be renumbered 4.19 to 4.24.*

## **Part 7, Chapter 2 Construction Procedures**

**Effective date 1 August 2008**

### **■ Section 4 Joints and connections**

*Existing sub-Sections 4.10 to 4.29 are to be renumbered 4.9 to 4.28.*

## Cross-references

Section numbering in brackets reflects any Section renumbering necessitated by any of the Notices that update the current version of the Rules for Special Service Craft.

### Part 6, Chapter 2

4.21.1                *Reference Fig. 2.4.3 now reads Fig. 2.4.2.*  
(4.15.1)

### Part 6, Chapter 3

1.20.1                *Reference Ch 2, 4.16 now reads*  
Ch 2,4.10.

### Part 7, Chapter 2

4.4.1                *Reference 4.21 now reads 4.20.*

### Part 7, Chapter 3

1.10.1                *Reference Ch 2,4.29 now reads*  
Ch 2,4.28.

1.20.1                *Reference Ch 2,4.16 now reads*  
Ch 2,4.15.

3.13.2                *Reference Ch 2,4.22 now reads*  
Ch 2,4.21.

### Part 7, Chapter 5

2.3.7                *Reference Ch 2,4.26 now reads*  
Ch 2,4.25.

### Part 8, Chapter 5

2.3.7                *Reference Ch 2,4.26 now reads*  
Ch 2,4.25.



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